

What is claimed is:

[Claim 1] 1. A structural building component for a residential or light commercial building comprising:

a PV laminate; and

a plastic frame disposed at least around said PV laminate, said frame including a first electrical connector for communication with said PV laminate and receptive to electrical connection with a contiguous PV laminate, said first electrical connector configured to facilitate electrical and mechanical connection with said contiguous PV laminate, said frame having a means for facilitating attachment to the building structure.

[Claim 2] 2. The component of claim 1, wherein said means for facilitating attachment to the building structure includes:

a plurality of slots configured in said plastic frame receptive to a fastening means therethrough; and

a keyed channel configured in said plastic frame receptive to a batten.

[Claim 3] 3. The component of claim 1, wherein said plastic frame includes a heat sink structure embedded therewith.

[Claim 4] 4. The component of claim 3, wherein said heat sink structure includes one of heat radiators and convective channels in thermal communication with said electrical connector, said electrical connector providing a thermal conduit to an edge defining said PV laminate where said one of said heat radiators and convective channels are disposed.

[Claim 5] 5. The component of claim 4, wherein said one of said heat radiators and convective channels are insert molded with said plastic frame.

[Claim 6] 6. The component of claim 1, wherein said PV laminate and said plastic frame is a PV roofing tile for a residential or light commercial rooftop.

[Claim 7] 7. The component of claim 6, wherein said PV roofing tile includes said plastic frame disposed at least around said PV laminate and disposed on a polymer substrate sheathing, said polymer substrate sheathing receptive to direct installation on a rafter.

[Claim 8] 8. The component of claim 7, wherein said polymer substrate is a thermoplastic composite.

[Claim 9] 9. The component of claim 1, wherein said plastic frame is one of injection molded around a completed PV laminate and separately molded before integrating with said completed PV laminate.

[Claim 10] 10. The component of claim 1, further comprising:

a sealing member, said sealing member integrating at least one of electrical features, mechanical features, and weatherproof features that simplify installation and interconnection of a plurality of PV laminates.

[Claim 11] 11. The component of claim 10, wherein said sealing member includes a second electrical connector for electrical communication with said first electrical connector and a snap-fit connection feature for mechanical communication with a corresponding snap-fit connection feature on said plastic frame.

[Claim 12] 12. The component of claim 11, wherein said sealing member is configured to shield joining edges of contiguous plastic framed PV laminates from the environment.

[Claim 13] 13. The component of claim 11, wherein said sealing member is an elastomeric seal configured to accommodate sealing between said plastic frame and said PV laminate.

[Claim 14] 14. The component of claim 1, wherein said PV laminate includes:

a plurality of solar cells each having a first side and a second side, each of said plurality of solar cells configured to produce an electrical current when receiving photons on at least said first side;

a translucent encapsulant operably coupled to the first side of each of said plurality of solar cells;

an insulative substrate disposed on the second side of each of said plurality of solar cells; and

electrical interconnects disposed on said insulative substrate and operably coupled to the second side of each of said plurality of solar cells, said electrical

interconnects in electrical and thermal communication with said first electrical connector.

[Claim 15] 15. The component of claim 14, wherein said insulative substrate includes said plastic frame.

[Claim 16] 16. A method to form an integrated PV laminate and frame for a structural building component, the method comprising:

molding a first electrical connector in a plastic frame for communication with a PV laminate and receptive to electrical connection with a contiguous PV laminate;

molding a heat sink in said frame, said heat sink in thermal communication with said first electrical connector;

molding a snap-fit feature in said frame for interconnection with said contiguous PV tile;

configuring a means for facilitating attachment to the building structure in said frame; and

combining said frame with said PV laminate.

[Claim 17] 17. The method of claim 16, said means for facilitating attachment to the building structure includes:

a plurality of slots configured in said plastic frame receptive to a fastening means therethrough; and

a keyed channel configured in said plastic frame receptive to a batten.

[Claim 18] 18. The method of claim 16, further comprising:

disposing said plastic frame disposed at least around said PV laminate on a polymer substrate sheathing, said polymer substrate sheathing receptive to direct installation on a rafter.

[Claim 19] 19. The method of claim 16, further comprising:

molding a sealing member, said sealing member integrating at least one of electrical features, mechanical features, and weatherproof features that simplify installation and interconnection of a plurality of PV laminates.

[Claim 20] 20. The method of claim 19, wherein said sealing member includes a second electrical connector for electrical communication with said first electrical connector and a snap-fit connection feature for mechanical communication with a corresponding snap-fit connection feature on said plastic frame.

[Claim 21] 21. The method of claim 20, wherein said sealing member is configured to shield joining edges of contiguous plastic framed PV laminates from the environment.

[Claim 22] 22. The method of claim 20, wherein said sealing member is an elastomeric seal configured to accommodate sealing between said plastic frame and said PV laminate.

[Claim 23] 23. The method of claim 16, wherein said PV laminate and said plastic frame is a PV roofing tile for a residential or light commercial rooftop.

[Claim 24] 24. The method of claim 16, wherein said combining includes one of injection molding said frame around said laminate and separately forming said frame and disposing said frame around said laminate.

[Claim 25] 25. The method of claim 16, wherein said combining includes integrating an insulating substrate of said PV laminate with said frame.